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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/820,570	04/08/2004	Michael L. Boroson	87454RLO	8580

7590 09/22/2005

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EXAMINER	
DONG, DALEI	

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 09/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/820,570	BOROSON ET AL.	
	Examiner	Art Unit	
	Dalei Dong	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 August 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The Amendment filed on August 8, 2005, has been entered and acknowledged by the Examiner.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-4, 6-8, 10-19, 21-23 and 25-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted prior art in view of U.S. Patent No. 6,873,093 to Yu.

Regarding to claim 1, Applicant's admitted prior art in Figure 1 of the Disclosure, discloses a tuned OLED device (10), comprising a microcavity structure (70) including a light-emitting layer (50) for producing light, a semitransparent reflector (30), and a reflector layer (90) disposed on opposite sides of the light-emitting layer (50), the microcavity structure enhancing on-axis (125) light produced from the light-emitting layer in at least one particular wavelength to produce a desired on-axis (125) viewed color while not substantially enhancing on-axis (125) other wavelength of such light.

However, Applicant's admitted prior art does not disclose a layer including a color change medium which is responsive to wavelengths of light shorter than the

particular wavelength by absorbing such shorter wavelengths of light and emitting light corresponding in color to the particular wavelength, thereby improving the color of the light produced by the OLED device when viewed in an off-axis direction.

The Yu reference teaches in Figures 5 and 6, an organic light-emitting diode display structure including: a layer (365) including a color change medium (312, 317, 322) which is responsive to wavelengths of light shorter (blue light with shorter wavelength) than the particular wavelength (green light wavelength and red light wavelength) by absorbing such shorter wavelengths of light (blue) and emitting light corresponding in color (green and red) to the particular wavelength (green light wavelength and red light wavelength) for the purpose of improving contrast ratios between different colors and thus improves the readability of the OLED device in high ambient light conditions.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilize the color changing layer of Yu for the OLED device of Applicant's admitted prior art in order to improving contrast ratios between different colors and thus improves the readability of the OLED device in high ambient light conditions.

Regarding to claim 2, Applicant's admitted prior art in Figure 1, discloses the light-emitting layer (50) produces broadband wavelength light.

Regarding to claim 3, Applicant's admitted prior art in Figure 1, discloses the particular wavelength of on-axis light is in the red, green, or blue portion of the spectrum.

Regarding to claim 4, Yu teaches in Figures 5 and 6, the color change medium layer (365) is disposed over the over the substrate (240) and thus it would have been obvious to one having ordinary skill in the art at the time the invention was made to have disposed the color changing medium of Yu over the semitransparent reflector of the Applicant's admitted prior art and the motivation to combine is the same as above.

Regarding to claim 6, Applicant's admitted prior art in Figure 1, discloses the reflector (90) also functions as an electrode.

Regarding to claim 7, Applicant's admitted prior art in Figure 1, discloses the semitransparent reflector (30) also functions as an electrode.

Regarding to claim 8, Yu teaches in Figures 5 and 6, the device is in a passive matrix device and the motivation to combine is the same as above.

Regarding to claim 10, Applicant's admitted prior art in Figure 1, discloses the microcavity structure (70) further includes a transparent cavity-spacer layer (35).

Regarding to claim 11, Applicant's admitted prior art in Figure 1, discloses the thickness of the transparent cavity-spacer layer (35), refractive index of the transparent cavity-spacer layer (35), or both, are adjusted in conjunction with the thickness and refractive index of the layers of the tuned OLED device to tune the microcavity structure to the desired color.

Regarding to claim 12, Applicant's admitted prior art in Figure 1, discloses the device (10) is bottom-emitting.

Regarding to claim 13, Applicant's admitted prior art in Figure 1, discloses it is old and well known in the art to have the device (10) is top-emitting.

Regarding to claim 14, Yu teaches in Figures 5 and 6, the OLED device including a color filter (370) and the motivation to combine is the same as above.

Regarding to claim 15, Applicant's admitted prior art in Figure 1 of the Disclosure, discloses a tuned OLED device (10), comprising a microcavity structure (70) including a light-emitting layer (50) for producing light, a semitransparent reflector (30), and a reflector layer (90) disposed on opposite sides of the light-emitting layer (50), the microcavity structure enhancing on-axis (125) light produced from the light-emitting layer in at least one particular wavelength to produce a desired on-axis (125) viewed color while not substantially enhancing on-axis (125) other wavelength of such light.

However, Applicant's admitted prior art does not disclose an array of different color pixels wherein at least two different color pixels having a layer including a color change medium which is responsive to wavelengths of light shorter than the particular wavelength by absorbing such shorter wavelengths of light and emitting light corresponding in color to the particular wavelength, thereby improving the color of the light produced by the OLED device when viewed in an off-axis direction.

The Yu reference teaches in Figures 5 and 6, an organic light-emitting diode display structure having an array of different color pixels having: a layer (365) including a color change medium (312, 317, 322) which is responsive to wavelengths of light shorter (blue light with shorter wavelength) than the particular wavelength (green light wavelength and red light wavelength) by absorbing such shorter wavelengths of light (blue) and emitting light corresponding in color (green and red) to the particular wavelength (green light wavelength and red light wavelength) for the purpose of improving contrast ratios between different colors and thus improves the readability of the OLED device in high ambient light conditions.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilize the color changing layer of Yu for the OLED device of Applicant's admitted prior art in order to improving contrast ratios between different colors and thus improves the readability of the OLED device in high ambient light conditions.

Regarding to claim 16, Yu teaches in Figures 5 and 6, there is a common light-emitting layer (emitting the same color blue for all three pixels) for the microcavity structure for each of the at least two such different color pixels.

Regarding to claim 17, Applicant's admitted prior art in Figure 1, discloses the light-emitting layer (50) produces broadband wavelength light.

Regarding to claim 18, Applicant's admitted prior art in Figure 1, discloses the particular wavelength of on-axis light is in the red, green, or blue portion of the spectrum.

Regarding to claim 19, Yu teaches in Figures 5 and 6, the color change medium layer (365) is disposed over the semitransparent reflector (224, where the Examiner interprets anode 224 as the semitransparent reflector layer of the OLED of the Yu reference) and the motivation to combine is the same as above.

Regarding to claim 21, Applicant's admitted prior art in Figure 1, discloses the reflector (90) also functions as an electrode.

Regarding to claim 22, Applicant's admitted prior art in Figure 1, discloses the semitransparent reflector (30) also functions as an electrode.

Regarding to claim 23, Yu teaches in Figures 5 and 6, the device is in a passive matrix device and the motivation to combine is the same as above.

Regarding to claim 25, Applicant's admitted prior art in Figure 1, discloses the microcavity structure (70) further includes a transparent cavity-spacer layer (35).

Regarding to claim 26, Applicant's admitted prior art in Figure 1, discloses the thickness of the transparent cavity-spacer layer (35), refractive index of the transparent cavity-spacer layer (35), or both, are adjusted in conjunction with the thickness and refractive index of the layers of the tuned OLED device to tune the microcavity structure to the desired color.

Regarding to claim 27, Yu teaches in Figures 5 and 6, one or more of the OLED (205) layers are separately patterned for one or more of the pixels and the motivation to combine is the same as above.

Regarding to claim 28, Applicant's admitted prior art in Figure 1, discloses the device (10) is bottom-emitting.

Regarding to claim 29, Applicant's admitted prior art in Figure 1, discloses it is old and well known in the art to have the device (10) is top-emitting.

Regarding to claim 30, Yu teaches in Figures 5 and 6, the OLED device including one or more of the pixels further include different color filters (370) and the motivation to combine is the same as above.

Regarding to claim 31, Yu teaches in Figures 5 and 6, the device is a full color device (comprises of red, green and blue colors).

4. Claims 5 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted prior art in view of U.S. Patent No. 6,873,093 to Yu and in further view of U.S. Patent No. 6,309,486 to Kawaguchi.

Regarding to claim 5, Applicant's admitted prior art in view of the Yu reference discloses a tuned OLED device (10), comprising a microcavity structure (70) including a light-emitting layer (50) for producing light, a semitransparent reflector (30), and a reflector layer (90) disposed on opposite sides of the light-emitting layer (50), the microcavity structure enhancing on-axis (125) light produced from the light-emitting layer in at least one particular wavelength to produce a desired on-axis (125) viewed color while not substantially enhancing on-axis (125) other wavelength of such light; and a layer including a color change medium which is responsive to wavelengths of light shorter than the particular wavelength by absorbing such shorter wavelengths of light and emitting light corresponding in color to the particular wavelength, thereby improving the color of the light produced by the OLED device when viewed in an off-axis direction.

However, Applicant's admitted prior art and the Yu reference do not disclose a dielectric stack disposed between the color changing medium layer and the semitransparent reflector.

The Kawaguchi reference teaches in Figure 3, an organic light-emitting device having a dielectric stack (2 and/or 3) disposed between the color changing medium layer (4, 5 and 6) and the semitransparent reflector (8) for the purpose of providing a flat surface without adversely affecting the color conversion characteristics of the color changing medium layer and further blocks impurities entered into the device and thus prevent the degradation of the color changing medium layer.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilize the color changing layer of Yu and the dielectric stack of Kawaguchi for the OLED device of Applicant's admitted prior art in order to improving contrast ratios between different colors and thus improves the readability of the OLED device in high ambient light conditions and providing a flat surface without adversely affecting the color conversion characteristics of the color changing medium layer and furthermore blocks impurities entered into the device and thus prevent the degradation of the color changing medium layer.

Regarding to claim 20, Kawaguchi reference teaches in Figure 3, an organic light-emitting device having a dielectric stack (2 and/or 3) disposed between the color changing medium layer (4, 5 and 6) and the semitransparent reflector (8) and the motivation to combine is the same as above.

5. Claims 9 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted prior art in view of U.S. Patent No. 6,873,093 to Yu and in further view of U.S. Patent No. 6,281,634 to Yokoyama.

Regarding to claim 9, Applicant's admitted prior art in view of the Yu reference discloses a tuned OLED device (10), comprising a microcavity structure (70) including a light-emitting layer (50) for producing light, a semitransparent reflector (30), and a reflector layer (90) disposed on opposite sides of the light-emitting layer (50), the microcavity structure enhancing on-axis (125) light produced from the light-emitting layer in at least one particular wavelength to produce a desired on-axis (125) viewed color while not substantially enhancing on-axis (125) other wavelength of such light; and a layer including a color change medium which is responsive to wavelengths of light shorter than the particular wavelength by absorbing such shorter wavelengths of light and emitting light corresponding in color to the particular wavelength, thereby improving the color of the light produced by the OLED device when viewed in an off-axis direction.

However, Applicant's admitted prior art and the Yu reference do not disclose the device is an active matrix device.

The Yokoyama reference teaches in Figures 5 and 8, the color electroluminescent display device is an active matrix device for the purpose of actively addresses each pixel within the display device.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilize the color changing layer of Yu and active OLED device of Yokoyama for the OLED device of Applicant's admitted prior art in

order to improving contrast ratios between different colors and thus improves the readability of the OLED device in high ambient light conditions and providing a flat surface without adversely affecting the color conversion characteristics of the color changing medium layer and furthermore actively address each pixel of the display device to obtain desired color.

Regarding to claim 24, Yokoyama reference teaches in Figures 5 and 8, the color electroluminescent display device is an active matrix device and the motivation to combine is the same as above.

Response to Arguments

6. Applicant's arguments filed August 8, 2005 have been fully considered but they are not persuasive.

In response to Applicant's argument that the color filter array of the Yu reference is not a color change medium. The Examiner asserts that color filter array is a color change medium wherein the a color is emitted from the OLED and the color filter array changes the color that is emitted from the OLED and thus the color filter array is a color change medium. The Applicant asserts that the claimed color changing layer absorbs lower wavelength of light and re-emits at a higher wavelength corresponding to the desired emission color. The Examiner asserts that the color filter array of the Yu reference performs the exact claimed function. The color filter array of the Yu reference absorbs a shorter wavelength of blue light and re-emits at a higher wavelength

corresponding to the desired emission color of green and red light. Furthermore, by emitting different colors, instead of just one color, the contrast of the display device is improved. Thus, the Examiner asserts that the Yu reference does teach a color change medium and maintains the rejection.

In response to Applicant's argument that the Examiner misinterprets transparent electrode of the Yu reference as the semi-transparent reflector. The Examiner asserts that the semi-transparent reflector is already taught by the Applicant's admitted prior art, and the Examiner is merely demonstrating the positioning of the color changing layer of the Yu reference. Wherein the color changing layer of the Yu reference is disposed between the substrate and the OLED device, thus it would have been obvious to one having ordinary skill in the art at the time the invention was made to have arrange the color changing layer of the Yu reference between the substrate and the microcavity display device of the Applicant's admitted prior art.

In response to Applicant's argument that the Yu reference fails to teach or suggest the common emitting layer produces light having spectral components for each of the associated pixel. However, this limitation is not claimed in claim 16, the Applicant merely claims a common light-emitting layer for each of the at least two different color pixels as taught by the Yu reference. Thus, this argument rendered moot. Therefore, the Examiner asserts that the Yu reference teaches the claimed features of claim 16.

Finally, in response to Applicant's argument that there is no suggestion in the references of the claimed dielectric stack. The Examiner asserts that the Kawaguchi reference clearly teaches a dielectric stack (2 and/or 3) disposed between the color

changing medium layer (4, 5 and 6) and the semitransparent reflector (8). Thus, the Examiner asserts that the prior art of record teaches the claimed invention and maintains the rejection.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dalei Dong whose telephone number is (571)272-2370. The examiner can normally be reached on 8 A.M. to 5 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar Patel can be reached on (571)272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

D.D.
September 14, 2005

Joseph Williams
Primary Examiner
Art Unit 2879